

REMARKS

Claims 1-4, 12 and 13 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Hansen et al (US 5,589,256).

Claims 1, 5-11 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Hansen et al (US 5,589,256) as applied to Claims 1-4, 12 and 13 and further in view of Hansen et al (US 5,789,326).

Amendments to the Claims

Claim 7 has been amended to correct a typographical error and now recites "acyclic" polyol instead of "alicyclic" polyol. Support for this change is on page 4 of the Specification, lines 25 – 28.

The Rejection of Claims 1-4, 12 and 13 Under 35 U.S.C. § 103 (a)

Claims 1-4, 12 and 13 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Hansen et al (US 5,589,256). Applicants wish to point out that by the response filed on November 28, 2005, there are now 14 claims in the application. Withdrawal of the rejection is respectfully requested for the following reasons.

As a whole, the Hansen et al. disclosure relates to binding of particles through *hydrogen bonding* and *coordinate covalent bonding* sites, not to *covalent intrafiber crosslinking* of cellulose fibers with a crosslinking agent in the presence of a polyol.

The Hansen et al. reference (the '256 patent) further relates to use of polymeric and non-polymeric binders for fibers and the use of such binders in binding fibers to particles (column 1, lines 1-3). Hansen et al. achieve the objectives of their invention by providing fibers with hydrogen bonding functional sites and applying, to the fibers, a binder with a volatility less than water. The binder has two functional groups, one that forms a hydrogen bond with the fibers and the second that is also capable of forming a hydrogen bond or coordinate covalent bond with particles that have a hydrogen bonding or coordinate covalent bonding functionality column 2, lines 57-64. The binders can be

present on the fibers in an inactive state, can be placed on the fibers, air dried and later reactivated by moistening the fibers. The binder can be activated by kinetic energy and activated or reactivated by heating the fibers after applying the binder to the fibers column 3, lines 2-17. The polymeric binder has a hydrogen bonding functionality or coordinate covalent bond forming functionality on each repeating unit of the polymeric binder column 3, lines 49 - 51. The non- polymeric binder has a volatility less than water, a functional group that forms hydrogen bonds or coordinate covalent bonds with the particles and a functional group that forms hydrogen bonds with the cellulose fibers, column 3, lines 52 - 55.

The fibrous material may be cellulosic or synthetic fibers that are capable of forming hydrogen bonds with the binder while the particles are selected to be of the type that form hydrogen bonds or coordinate covalent bonds with the binder. In a specific example of the particle, Hansen et al. discloses superabsorbent particles that form hydrogen bonds or coordinate covalent bonds with the binder while the binder in turn forms hydrogen bonds with the hydroxyl groups of the cellulose fibers, column 4, lines 33-37. In another method, Hansen et al. disclose binding particles to fibers in which the particles are insoluble in the binder. Here again the particles have functional groups that can form hydrogen or coordinate covalent bonds with the binder, and the binder is capable of forming hydrogen bonds to the fibers, column 4, lines 58 – 64. Fibers of the Hansen et al. invention can be pretreated for example, by steam, chemical, or crosslinking, column 6, lines 28-30.

Hansen et al. teach away from forming covalent bonds such as in the instant invention and differentiate from crosslinking in that the fibers can be bound to the particles without the application of heat, whereas in the crosslinking reaction elevated temperatures are required to covalently crosslink cellulose groups, column 20, line column 20, line 66 - column 21 line 5. The Hansen et al. invention discloses the formation of hydrogen or coordinate covalent bonds below 145°C to room temperature in contrast to covalent bond formation which requires temperatures above 145°C and acidic conditions, column 22, lines 58-65. Furthermore, Hansen et al. state that binding is performed under conditions that favor formation of hydrogen bonds or coordinate covalent bonds and *discourage* formation of covalent bonds, column 22, lines 44-46.

Hansen et al. recognize that in processes that use polycarboxylic acid, polyols and polyamines that covalent bond formation can occur and accordingly indicate that fibers should contain at least 20 -50% water by weight during curing so that some of the binder remains available for noncovalent bonds with the particles, column 23, lines 18 – 30. Applicants submit that the Hansen et al. disclosure teaches away from intrafiber covalent crosslinking of cellulose fibers with a crosslinking agent in the presence of a polyol as in the instant invention and one skilled in the art would not look to the Hansen et al. invention which teaches binding of particle by hydrogen bonding an coordinate covalent bonding to arrive at the claimed invention.

The Examiner states that the crosslinking substance can be polycarboxylic acids such as citric acid and then sets forth from the Hansen et al. disclosure that the binder being applied to the fibers may be selected as a combination of a polycarboxylic acid and a polyol in column 19, line 61. Applicants submit that in the context of the discussion under the heading of "Non-polymeric Binder Characteristics", Hansen et al. are merely pointing out functional groups of the non-polymeric binders may be selected for forming hydrogen bonds or coordinate covalent bonds with the particle of which a polycarboxylic acid and a polyol are one combination that contains these functionalities. Hansen et al. do not state that the polycarboxylic acid and the polyol are used in combination during the crosslinking reaction to form intrafiber crosslinked fibers since the crosslinking which occurs during curing would result in the binder no longer being available for hydrogen bonding or coordinate covalent bonding, column 23, lines 9 – 15 and thereby destroy the objects of the Hansen et al. invention.

Applicants submit there is no motivation for one skilled in the art to use the Hansen et al. reference to arrive at the instant invention since it does not teach the combination of crosslinking a cellulose fiber with a crosslinking agent in the presence of a polyol, does not show a Whiteness Index greater than about 69 nor all the elements of the instant invention. Furthermore the reference teaches away from covalent bond formation and is directed to binding of particles with binders that have coordinate covalent bonding and hydrogen bonding sites. Withdrawal of the rejection is respectfully requested.

The Rejection of Claims 1, and 5-11, Under 35 U.S.C. § 103 (a)

Claims 1 and 5-11 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Hansen et al (US 5,589,256) as applied to Claims 1-4, 12 and 13 and further in view of Hansen et al (US 5,789,326). Withdrawal of the rejection is respectfully requested for the following reasons.

Claim 1 has been addressed above, Claims 5-11 are dependent on Claim 1.

The Hansen et al. reference (the '326 patent) also discloses binding particles to fibers by providing fibers with hydrogen bonding functional sites and binders that have a volatility less than water. The binders comprise binder molecules and the binder molecule has at least one functional group capable of forming a hydrogen bond with the fibers and at least one functional group that is also capable of forming a hydrogen bond or a coordinate covalent bond with the particles that have a hydrogen-bonding or coordinate covalent bonding functionality, column 3, lines 13-23. The '326 reference is cited to show that sorbitol, as set forth in Claims 6 and 7, is specifically identified as a polyol not disclosed in the '256 patent and since it is a polyol also embraces the polyols cited in the instant invention. The Examiner concludes that one of ordinary skill in the art would have been motivated to employ the prior art method with the expectation of obtaining the product because of the expectation of analogous materials to react similarly. Furthermore the Examiner states it would have been obvious to substitute the polyols used in the '256 patent with sorbitol as evidenced in the '326 patent, that use of sorbitol provides sufficient functional groups for forming a hydrogen bond or coordinate covalent bond. Applicants respectfully disagree.

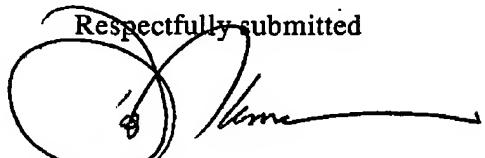
As cited in the '326 patent, the non- polymeric binder sorbitol is a binder molecule having at least one functional group capable of forming a hydrogen bond or a coordinate covalent bond with particles having a hydrogen bonding or a coordinate covalent bond forming functionality and at least one functional group capable of forming a hydrogen bond with the fibers. Applicant submit that there is no motivation, teaching or suggestion to combine the '256 and '326 patents to arrive at the claimed invention since, as in the '256 patent, the '326 patent teaches away from covalent bonding. Stated in another way, the '326 patent teaches particle binding with a non-polymeric binder having at least one functional group capable of forming a hydrogen bond or a coordinate

covalent bond with particles having a hydrogen bonding or a coordinate covalent bond forming functionality and at least one functional group capable of forming a hydrogen bond with the fibers. Additionally, the '326 patent does not include the limitations of Claims 13 and 14 of the instant invention. Withdrawal of the rejection is respectfully requested.

CONCLUSION

Based on the foregoing, Applicants submit that the application is in condition for allowance and request that it proceed accordingly. If the Examiner has any further questions or comments the Examiner is invited to contact the Applicants' agent.

Respectfully submitted



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